

WHAT IS CLAIMED IS:

1. A method of constructing a composite structure, comprising:
positioning a plurality of forming elements on a skin panel formed
from a composite material in a predetermined configuration;
5 disposing a stiffening panel formed from an uncured composite
material outwardly from the forming elements to create a plurality of contact
regions between the skin panel and the stiffening panel; and
curing the skin panel and the stiffening panel to bond the skin panel
and the stiffening panel together at the contact regions.
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2. The method of Claim 1, further comprising removing the forming
elements after curing the skin panel and the stiffening panel.
3. The method of Claim 1, further comprising coupling the skin panel and
15 the stiffening panel with a plurality of fasteners.
4. The method of Claim 3, wherein coupling the skin panel and the
stiffening panel with the fasteners comprises coupling the skin panel and the
stiffening panel with a plurality of Z-pins proximate the contact regions.
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5. The method of Claim 1, wherein the skin panel is formed from a
composite material selected from the group consisting of a cured composite material
and an uncured composite material.
- 25 6. The method of Claim 1, wherein disposing the stiffening panel
comprises spraying a composite material outwardly from the forming elements.
7. The method of Claim 1, wherein disposing the stiffening panel formed
from the uncured composite material comprises disposing a stiffening panel formed
30 from an uncured composite material having a plurality of discontinuous fibers.

8. The method of Claim 1, wherein positioning the forming elements on the skin panel in the predetermined configuration comprises positioning the forming elements in a corrugated configuration.

5 9. The method of Claim 1, wherein positioning the forming elements on the skin panel in the predetermined configuration comprises positioning the forming elements in a waffle configuration.

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10. A method of constructing a composite structure, comprising:
positioning a plurality of forming elements on a skin panel formed
from a composite material in a corrugated configuration;

5 disposing a stiffening panel formed from an uncured composite
material having a plurality of discontinuous fibers outwardly from the skin
panel and the forming elements;

10 partial-curing the skin panel and the stiffening panel to create a
plurality of first contact regions between the skin panel and the stiffening
panel and to create a plurality of second contact regions between the forming
elements and the stiffening panel;

coupling the skin panel and the stiffening panel with a plurality of
fasteners proximate the first contact regions; and

15 final curing the skin panel and the stiffening panel to bond the skin
panel and the stiffening panel together at the first contact regions.

11. The method of Claim 10, further comprising removing the forming
elements after final curing the skin panel and the stiffening panel.

20 12. The method of Claim 11, wherein coupling the skin panel and the
stiffening panel with the fasteners comprises coupling the skin panel and the
stiffening panel with a plurality of Z-pins proximate the first contact regions.

25 13. The method of Claim 10, wherein the skin panel is formed from a
composite material selected from the group consisting of a partially-cured composite
material and an uncured composite material.

14. The method of Claim 10, wherein disposing the stiffening panel
comprises spraying a composite material outwardly from the forming elements.

15. A method of constructing a composite structure, comprising:

positioning a plurality of forming elements on a first surface of a skin panel formed from a composite material selected from the group consisting of a cured composite material and an uncured composite material, the forming elements and the first surface of the skin panel creating a predetermined configuration;

forming a stiffening panel from an uncured composite material having a plurality of discontinuous fibers on a tool having a configuration substantially the same as the predetermined configuration;

heating the stiffening panel to a state sufficient enough to enable handling of the stiffening panel while maintaining its configuration;

disposing the stiffening panel outwardly from the skin panel and the forming elements to create a plurality of first contact regions between the skin panel and the stiffening panel and to create a plurality of second contact regions between the forming elements and the stiffening panel; and

curing the skin panel and the stiffening panel to bond the skin panel and the stiffening panel together at the first contact regions.

16. The method of Claim 15, further comprising removing the forming elements after curing the skin panel and the stiffening panel.

17. The method of Claim 15, wherein coupling the skin panel and the stiffening panel with the fasteners comprises coupling the skin panel and the stiffening panel with a plurality of Z-pins proximate the contact regions.

18. The method of Claim 15, wherein the predetermined configuration is a corrugated configuration.

19. The method of Claim 15, wherein the predetermined configuration is a waffle configuration.

20. A composite structure, comprising:
a skin panel formed from a composite material;
a plurality of forming elements positioned on the skin panel in a
corrugated configuration;
5 a stiffening panel formed from an uncured composite material having a
plurality of discontinuous fibers disposed outwardly from the skin panel and
the forming elements;
a plurality of contact regions created by the skin panel and the
stiffening panel;
10 a plurality of fasteners coupling the skin panel and the stiffening panel
proximate the contact regions; and
a plurality of bonding regions proximate the contact regions, the
bonding regions created by curing the skin panel and the stiffening panel.

21. The composite structure of Claim 20, wherein the fasteners are Z-pins.

22. The composite structure of Claim 20, wherein the skin panel is formed
from a composite material selected from the group consisting of a cured composite
material and an uncured composite material.

23. The composite structure of Claim 20, wherein the stiffening panel is
sprayed on the forming elements and the skin panel.